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Extent and Determinants of Impaired Mobility in Primigravida Postpartum Females with Pelvic Pain: An Observational Cross-Sectional Study

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ABSTRACT

Background: Pelvic girdle pain refers to pain in the pelvis during pregnancy. It can significantly impact a woman's quality of life by limiting her mobility. It can cause significant physical disability and can have a psychological impact on the individual. However, it has no identified risk factors or determinants associated with it. This study aimed to understand the extent of this problem and identify potential determinants in primigravida postpartum females.

Methods: Primigravida females with a mean age of 24.5±3.33 within 2 to 6 months of the postpartum period were interviewed via a questionnaire enquiring about the presence of pelvic pain, body mass index (BMI), and type of delivery. Further, the piriformis muscle tightness assessment and pregnancy mobility index quantification were performed. Outcomes assessed were the presence of pelvic pain and the Score of Pregnancy Mobility Index in those positive for pelvic pain. Possible associations of pelvic pain with type of delivery, BMI, and piriformis tightness were studied using a non-parametric test.

Results: The study found that 62% of the women experienced pelvic pain, with the most significant limitations in household chores and outdoor activities. Tightness in the piriformis muscle was identified as a potential risk factor for pelvic pain. ($p<0.05$).

Conclusion: These findings suggest that pelvic pain is a common issue after childbirth and can significantly impact a woman's ability to perform daily tasks. Piriformis tightness is a potential determinant of pelvic pain in primigravida postpartum females; thus, targeting its tightness may be a potential strategy for preventing or managing pelvic pain in primigravida postpartum females.

Keywords: Pregnancy, Postpartum Period; Pelvic Girdle Pain; Quality of Life, Risk Factors.

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INTRODUCTION

During pregnancy, Pelvic Girdle Pain (PGP) is characterized by pain or discomfort in the lower back, pelvis, hips, or thighs. The pain is often felt near the sacroiliac joint, between the gluteal fold and the posterior iliac crest [1]. Its prevalence rate is significantly higher during pregnancy and may begin as early as the first trimester. Thereafter, it can persist even after childbirth in the postpartum period, potentially lasting up to two years [2]. Some women may also report chronicity of PGP.

While pregnancy is the most common cause, PGP can also arise from other factors, including chronic pelvic infections, endometriosis, piriformis syndrome, inflammatory bowel diseases, visceral hyperalgesia, tightness or trigger points in the quadratus lumborum, somatization disorders, and neuralgia of the pudendal nerve [1, 3]. Its risk increases with a positive history of low back pain or a similar history of PGP during a previous pregnancy. Additionally, mental tension may contribute to the development of PGP. Equivocal association with PGP has been shown in terms of age, parity, level of exercise, and work history.[1] The mechanism underlying PGP involves the release of pain-producing substances in response to neural inflammation or trauma. These substances can originate from various tissues, including muscles, ligaments, tendons, bones, or other pathological conditions [4]. Inconsistent findings have been reported about the causal factors for PGP.

The most accepted pathomechanics suggest that the growing uterus shifts the body's center of gravity forward during pregnancy, placing increased strain on the pelvis and the spine. Additionally, hormonal changes cause ligaments to get lax, further destabilizing the pelvic joints. These altered biomechanics can lead to excessive movement and dysfunction within the pelvis [5]. The resulting pelvic instability can manifest in various ways, including pain or discomfort in the lower back, pelvis, hips, or thighs [6]; functional disturbances like carrying out day-to-day activities involving sleeping, turning over in bed, sitting, walking, and basic house chores [7,8]. Additionally, it also manifests in mobility impairments, like reduced range of motion and overall physical activity levels. Despite its prevalence and the fact that this condition can significantly impair a woman's mobility and quality of life, the extent and determinants of impaired mobility in postpartum women with PGP remain understudied.

The primary aim of this study is to investigate the extent of impaired mobility in primigravida postpartum females experiencing pelvic pain. Additionally, the study will explore the determinants of this impairment, including factors such as the severity of pain, duration of symptoms, and sociodemographic characteristics. By understanding the factors contributing to impaired mobility, healthcare providers can develop targeted interventions to improve the physical function and overall well-being of postpartum women with PGP.

METHODS

Study Design and Participants:

This study employed a cross-sectional observational study designed to investigate the extent and determinants of impaired mobility in primigravida postpartum females experiencing pelvic pain. After obtaining ethical approval from the institutional review board, 100 primigravida women aged 18-33 years were recruited from the gynaecology outpatient department of Dr. D.Y. Patil Medical Hospital, Pune. These women were postpartum, ranging from 2 to 6 months after delivery. Multiparous women, those with a history of pelvic pain before pregnancy, pregnancy complications such as infections or genital problems, and continuous radiating pain below the knee on either side were excluded. Informed written consent was obtained from each participant before their inclusion in the study.

Data Collection:

Each participant was administered a structured questionnaire to collect demographic data such as age, education, occupation, and socioeconomic status. Pregnancy history, including type of delivery, gestational age, and birth weight, was also recorded. Participants were asked about the presence of pelvic pain before, during, and after pregnancy. The Pregnancy Mobility Index (PMI) [9] assessed their ability to perform daily activities and household chores. The Piriformis Test was also administered to evaluate piriformis muscle tightness by passively stretching the muscle and observing for pain or discomfort in the gluteal region or sciatic nerve distribution [10].

Outcome Measures:

The Piriformis Test was used to screen the subjects for tightness of the piriformis muscle or any other discomforts of the sciatic nerve. For this, the patient was in side-lying on the unaffected side. The affected leg was positioned with 90 degrees of flexion at the knee joint and 60-90 degrees of flexion at the hip. The patient lay with the face directed towards the therapist. The therapist then placed one hand on the pelvis to stabilize it and put pressure with the other hand on the lateral side of the knee, trying to stretch as much as possible. The therapist performed horizontal adduction while putting pressure on the knee towards the table. The patient may have felt pain or discomfort during the stretch. In a positive test, the patient complained of pain in the gluteal region or piriformis area.

PMI is a reliable and valid self-reported questionnaire that explores mobility for daily chores, household activities, and outdoor mobility after pregnancy. Females had to choose their level of mobility based on the possible answers from 'no problems performing this task', 'some effort performing this task', 'much effort performing this task', and 'performing this task is impossible or only possible with the aid of others'. Scoring was completed from 0, indicating "normal performance", to 100, indicating "maximum disability".

Data Analysis:

The collected data was analysed using Primer software. Statistical analysis determined the association between pelvic pain, piriformis tightness, and impaired mobility. Descriptive statistics, specifically mean and standard deviation, were used to characterize continuous variables like age and BMI. The chi-square test of independence was utilized to assess the relationship between categorical variables such as pregnancy type, body mass index (BMI) categories, and piriformis muscle tightness with the presence or absence of pelvic pain. A p-value <0.05 was considered statistically significant, suggesting a relationship between the variables.

RESULTS

The study population consisted of 100 primigravida postpartum females, with a mean age of 24.5 (3.33) years and a mean BMI of 20.1 (3.39) Kg/m^2(Table 1). On assessment of the PMI for the impact of pelvic pain on daily, household, and outdoor activities, the majority of participants experienced limitations in all three domains, with a higher proportion of participants graded as 1 (moderate limitation) compared to grade 0 (no limitation) or grade 2 (severe limitation) (Table 2).

Table 1: Demographic data of 100 primigravida postpartum females

Variable	Mean	Standard Deviation
Age	24.5	3.33
BMI	20.1	3.39

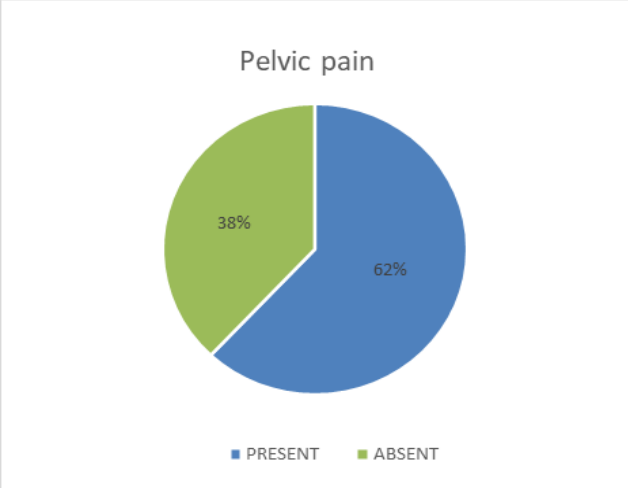
Table 2: Pregnancy Mobility Index for females with pelvic pain

	Pregnancy Mobility Index		
Domain of tasks	**Grade 0**	**Grade 1**	**Grade 2**
Daily Mobility	59.6 %	37.1 %	3.3 %
Household task	24.2 %	51.6 %	24.2 %
Outdoor task	41.9 %	50.0 %	8.1 %

A total of 62% (n=62) of the 100 primiparous postpartum women in the study sample reported experiencing pelvic pain. (Graph 1) Upon correlation analysis to investigate the relationship between pelvic pain and three factors: mode of delivery, BMI, and piriformis muscle tightness using the chi-square test, the results revealed no significant association between pelvic pain and either mode of delivery or BMI (p-value > 0.05). However, a strong association was found between pelvic pain and piriformis muscle tightness (p-value < 0.01). Individuals with tight piriformis muscles were significantly more likely to experience pelvic pain. These findings suggest that while mode of delivery and BMI are not significant risk factors, piriformis muscle tightness is strongly linked to pelvic pain development (Table 3).

Table 3: Association of pelvic pain and determinants

Determinants	Pelvic Pain		Chi-square test	p-value
	Yes	No		
Type of pregnancy • C-Section • Normal • Normal with Episiotomy	22 (64.70%) 13 (50%) 27 (67.5%)	12 (35.29%) 13 (50%) 13 (32.5%)	3.89	> 0.05
BMI • Normal • Underweight • Overweight	30 (57.69%) 20 (58.82%) 12 (85.71%)	22 (42.3%) 14 (41.17%) 2 (14.28%)	3.89	> 0.05
Piriformis Tightness • Present • Absent	43 (87.75%) 19 (37.25%)	6 (12.24%) 32 (62.74%)	27.05	< 0.05



Graph 1: Pelvic pain in postpartum females

DISCUSSION

PGP is often considered an inevitable part of pregnancy. However, a significant number of women experience significant discomfort and seek medical attention. In Sweden, 64% of women with PGP visited healthcare providers due to its impact on their quality of life [11]. The current study, involving 100 primiparous women, found that 62% experienced postpartum pelvic pain. Global studies have revealed a wide range of PGP prevalence, from 4% to 76.4% in Europe, with the Netherlands reporting the highest rate of 1 in 7 women. In India, 65% of women experienced posterior pelvic pain and 15% anterior pelvic pain, with urban women being more affected. Scandinavia, Asia, and Australia also report substantial rates of PGP, underscoring its global significance [12]. Furthermore, a study by Nielsen (2010)[9] indicated that 21% of women with PGP during pregnancy continued to experience pain and reduced quality of life two years after delivery.

The physiological changes associated with pregnancy, including abdominal distension and shifting in the center of mass, can lead to muscle impairment, especially during the 2nd and 3rd trimesters. This impairment can manifest as PGP. Furthermore, reducing force closure within the pelvic girdle can necessitate compensatory neuromuscular strategies, such as butt-gripping and chest-gripping. While initially intended to alleviate pain, these strategies may

inadvertently increase shear forces in the sacroiliac joint, thereby exacerbating pain [13]. Additionally, maladaptive pain behaviors, including pain avoidance and provocation, can further amplify pain and functional limitations [14].

Ideally, PGP exacerbates symptoms with changing posture. It also limits daily activities. This suggests that a low mobility index can be an essential risk factor for PGP. Likewise, in the present study, PMI showed a higher average score in females with pelvic pain. Such morbidity was seen as greatest for household activities, followed by outdoor mobility tasks. The higher frequency and repetitive nature of tasks could be the rationale. Additionally, household activities often involve more significant spinal movement and increased muscle activity in the lower back, including the pelvic region, which could contribute to this association [15]. Young females with a heavy workload or those with PGP during pregnancy are mainly at high risk of such morbidity. Higher musculoskeletal problems with fatigue, depression, and socioeconomic factors further add to its severity [1].

The current investigation did not identify a significant association between the mode of delivery and the incidence of pelvic pain. This finding is consistent with previous research results, as discussed by Blomquist et. al, 2014 [16] and Petrocnik et. al, 2023 [17], which report no relationship between mode of delivery and pelvic pain and pelvic floor function. Nevertheless, a notable observation was that women who underwent episiotomy reported the highest levels of pelvic pain, followed by those who underwent cesarean section and those who experienced a normal vaginal delivery. Episiotomy, cesarean section, and vaginal delivery can each contribute to the development of pelvic pain through distinct mechanisms. Episiotomy is associated with perineal trauma, while cesarean section can lead to pelvic adhesions, uterine scar defects, and nerve entrapment, all of which can contribute to the development of pelvic pain.

The current investigation did not identify any association between BMI and the onset of pelvic pain. While a large number of overweight women experienced pelvic pain, a significant percentage of overweight women did not. On the other hand, the number of people with pelvic pain compared to those without pain stayed almost the same for those with a normal weight and those who were underweight. The inconsistencies in the findings for all three BMI categories suggest such findings. Additionally, since BMI measurements were taken 2 to 6 months after childbirth, it's difficult to determine a direct cause-and-effect relationship between BMI and pelvic pain. In contrast to our results, a study by Biering et. al, 2011 [18] reported a positive association of BMI with pregnancy-related pelvic pain. However, the study can't justify whether all included had low back pain, which can affect the association found.

The piriformis muscle, the obturator internus, and the iliopsoas muscles are common sources of chronic pelvic pain. These muscles play crucial roles in stabilising the pelvis and supporting the spine. These muscles become tight or irritated, which can cause pain and discomfort in the pelvic region. In pregnancy, the piriformis muscle may be particularly susceptible to strain and tension due to hormonal changes and increased weight. This can lead to piriformis syndrome, characterised by pain in the buttocks and lower back. Additionally, the piriformis muscle can become overactive during "butt gripping," the compensatory strategy often used to stabilise the pelvis during pregnancy. This excessive muscle activity can further exacerbate pain and discomfort in the pelvic region [19]. These factors explain the observed association between piriformis muscle tightness and the onset of pelvic pain. A review by Bahat et. al, 2019 [20] also enlightens the role of piriformis syndrome in causing chronic pelvic pain.

The study specifically focused on the association between piriformis muscle tightness and pelvic pain, allowing for a detailed investigation of this relationship, a notable strength. The findings also have potential clinical implications for managing pelvic pain, particularly in identifying a potential target for intervention, further adding to its strength. However, the study has its limitations as well. The small sample size can't be generalized to a larger population. Furthermore, the reliance on self-reported data for assessing pelvic pain and piriformis muscle tightness introduces a potential source of bias. Objective measures like standardized pain questionnaires and physical examination findings could provide more accurate and reliable data. Lastly, the lack of a longitudinal follow-up limits the ability to assess the long-term impact of piriformis muscle tightness on pelvic pain and the effectiveness of interventions. Further studies can be done on a larger sample size to inspect chronic health issues such as infections. Also, early screening can contribute to decreasing the chronicity of pelvic pain in the postpartum period.

CONCLUSION

Pelvic pain is widely reported in postpartum females, which impairs mobility. The study also provides evidence for a strong association between piriformis muscle tightness and the development of postpartum pelvic pain, thus declaring it as the most probable determinant of pelvic pain in primigravida postpartum females. At the same time, the mode of delivery and BMI did not appear to be significant risk factors. Targeting piriformis muscle tightness through interventions such as stretching and physical therapy may, therefore, be beneficial in managing and preventing pelvic pain in postpartum women. However, further research with greater sample sizes and longitudinal monitoring must confirm these findings and explore the underlying mechanisms.

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Conflict of Interest:

The authors declare no potential conflict of interest relevant to this article.

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